DOCUMENT RESUME

ED 125 596 IR 003 683

AUTHOR Torr, Donald V.
TITLE Cost Related Decisions in the Application of Technology at Gallaudet College.
PUB DATE Jul 76
NOTE 16p.; Paper presented at the International Learning Technology Congress and Exposition on Applied Learning Technology for Human Resource Development (Washington, D.C., July 21-23, 1976)

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS Closed Circuit Television; Computer Assisted Instruction; *Cost Effectiveness; *Deaf Education; *Educational Technology; *Higher Education; Language Skills; On Line Systems; Research Needs
IDENTIFIERS *Gallaudet College

ABSTRACT

Gallaudet College, a liberal arts college serving the deaf, has explored educational technology as a way to improve the instructional process for deaf students. Closed-circuit television and on-line computers have been used with the effect of kindling student interest and increasing the capacity of instructors, but no formal analysis has been undertaken to see if the resulting gains in language skills merit the additional expenditures for the new technology. Television has been especially useful when used to present captioned news broadcasts and to present direct translations from sign language to written English. Despite the difficulty of measuring the outcomes of such projects, in the future, cost-effectiveness analysis will be undertaken to assess the benefits derived from the new technology. (EMH)

****
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
****

ED125596

COST RELATED DECISIONS IN THE APPLICATION OF TECHNOLOGY AT GALLAUDET COLLEGE

Donald V. Torr
Director, Office of Educational Technology
Gallaudet College
Washington, D. C.

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

IR 003 683

July, 1976

ABSTRACT

Gallaudet College is the only liberal arts college in the world for students who are deaf. Technology can be used to meet unique needs of deaf students as well as to meet the educational needs which deaf students share with all college students. Formal cost-benefit and cost-effectiveness analyses have not characterized technology related decisions at the college to date; however, formal analyses are being considered at this time. It is extremely difficult to establish a model of a cost-effectiveness analysis which deals realistically with the problems implicit in an operating educational environment where student need and faculty decisions take precedent over data collection requirements. Nevertheless such a model is needed and efforts are being made to identify it.

I work at Gallaudet College, the only liberal arts college for the deaf in the world. Our charge is tc provide an effective liberal arts education to college students who are deaf. The problem, therefore, has dimensions which are common to all college educators. It has other dimensions, however, which are unique to students who have been deaf since birth or shortly thereafter. I will concentrate on these latter dimensions today.

If you are born deaf or lose your ability to hear intelligible speech before you acquire the ability to converse in the dominant language of your culture you have extreme difficulty acquiring that language. The process of English language acquisition, for example, becomes highly contrived in such a case and there is no concensus as to how it can best be achieved. It appears to me that for most prelingually deaf individuals it is not fully achieved.

Each year a very select group of prelingually and some postlingually deaf students are accepted for admission to Gallaudet College. The students have the intellectual capacity for college work. Approximately 15 percent of the students are ready to enter the freshman year and face the heavily language dependent demands of a liberal arts curriculum. The remainder must enter a preparatory year, most of them because of weak language skills and the collateral knowledge deficit which accompanies 18 - 20 years of poor communication. The weak language base is naturally accompanied by reading and writing difficulties.

The Federal government made a strategic decision to allocate a measure of its resources to the college education of selected deaf citizens during Abraham Lincoln's administration. Presumably this cost-benefit type of action was not completely altruistic and there was some expectation that society would benefit by providing an advanced education to deaf individuals.

Gallaudet students have become leaders within the deaf community and are found in important positions with the government, education, and business. Typically, some 90 percent of the graduating class has found employment by graduation or has made plans for advanced study or marriage. We can expect, therefore, that there will be some return on investment by way of income tax and that other benefits to society will result from their education.

Six years ago I suggested that the College in turn make a kind of cost-benefit decision by allocating a portion of its resources to television and by increasing the allocation for the computer. I made these suggestions in 1970 when I was asked to start an Office of Educational Technology on the campus. I have since requested the allocation of additional resources with mixed results. At any rate the Office is now organized to provide resources to the faculty to assist them in the instructional process. To this end we have within the Office: a Computer Center providing a 70 line time-sharing system, a Television Production Unit with studio and remote color capability, photographic, artistic, and printing services, and instructional materials developers who work with the faculty and staff of the Office to coordinate the development of instructional materials and processes. Because of my role I am regularly in contact with faculty members: who are concerned with the quality of their instruction, who are frustrated by the difficulty of communicating the concepts of their discipline to students who have reading and writing problems, as well as a difficulty comprehending the teachers' face-to-face communication, and who wonder if "technology" can help.

To date most of my decisions have not been of a kind which could make use of cost-effectiveness analyses. I do see situations requiring decisions fairly soon which appear to be treatable by cost-effectiveness comparisons. I will describe

the kind of decision making process I have been following and comment upon situations where I believe an analysis can be of help.

Let me begin with television. Shortly after I joined the Gallaudet faculty in 1969 I became concerned that television was not widely available on the campus. I was concerned because it appeared to be a natural and logical medium for the deaf. It was not possible, for example, to establish audio-tutorial programs for these students, but video-tutorial programs seemed like a possibility. At that time in my thinking, however, I was more concerned with what I saw as an extreme isolation of our students from the rest of the world. Gallaudet brought them perhaps the widest social opportunity they would experience in their life, but for many of them it appeared to me that the world ended at the boundaries of the campus. Television, a major part of the culture within which they lived, had a very modest impact upon them. They could, for example, get something out of televised sport events (though they weren't likely to know the state of the clock in the last seconds of a close game) but they might have to make up a story to fit the action of a dramatic program.

I proposed that we install a cable and establish a closed-circuit television system on the campus. The cost of the distribution system would be quite low. What to distribute was another matter.

At this stage, however, the choice was between television or no television. I proposed that some television was better than no television and that the cost to determine if something could be done was initially modest. Perhaps this was a cost-benefit decision for the College as it determined whether there would be a benefit from allocating a portion of its resources to television. Money was made available to install a cable.

There was initially very little money available for production. One of the biggest programming possibilities was a video presentation of the news. Two of the major wire services were introducing video news service in which the Teletype version of their service had been edited to remove garbles. The printed text of the news was continuously updated on the television screen. Initially the cost of this service was too high and a five year contract was required. I didn't know if our students would use it and could not justify the expense for more than one year. The cost is now quite reasonable and we buy the service. At the time I am talking about, however, we had to resort to providing a locally generated message service for the campus. A message wheel was built using available skilled labor and materials. Messages, inserted in a continuous belt, fed at a fixed rate before a small black and white camera. In each building on campus one TV set displayed the messages. It was then possible for any student, teacher, or administrator to contact anyone else on campus more quickly than had ever been possible before and local news and a small amount of important world news

could be shared. The small amount of labor required to update the wheel was borrowed from other areas.

The insertion of world news messages was a compromise to the desired news service and was made possible by another production decision. With an almost non-existent production budget the question was what would provide the largest production volume for a fixed budget. Clearly, local production would yield very little in the way of viewing material. If we were to caption television programs broadcast to the hearing public, however, we could provide a larger number of programs each year. I hoped incidentally that steady access to English language captions would perhaps have an important impact upon student language skills. The decision to tape and caption was made and a captioner was hired. To implement this the broadcast program would be videotaped. The captioner would listen to the audio track and type the script. By the way, this captioner would also listen to the radio news several times a day and type short world news summaries for the message wheel.

In parallel with this, and to complete the captioning process, a cost-effectiveness decision had been made without formal computation, to the effect that we would use an optical system to add the captions to the taped program. We had a skilled person who could build a motor driven scroll which would display to a surplus TV camera the captions that had been typed on a continuous sheet of paper. The output of the

camera would be mixed with the playback of the original videotape of the program and a second generation videotape would be produced. This second tape would carry the original visual display and the captions. The cost-effectiveness decision here was pretty simple. We could not afford a character generator which would do the job, but we could afford the optical approach. Readable captions would result.

Our system has improved over the past six years, but it is still optical. Now, however, some members of the target population have more sophisticated expectations for their captions, in part because of the excellent quality of captions provided on a captioned ABC news program. The cost of captioning equipment of the type we think we need has dropped and our budget has grown somewhat so that the option of character generated captions is a viable one and our target population is telling us that the quality of the product should be improved. I expect that we will change our captioning technique during the next year.

At the same time we are also exploring the possible use of computer support for our captioners. (We now have three captioners.) At present captioners have to retype the script after a complete but rough draft has been made. A clean, continuous draft is needed for the scroll. We are considering the use of our time-sharing computer system or a minicomputer for on-line editing. This would reduce the time required to

produce the final draft of the script. A relatively low cost character generator which can be driven at high baud rates is expected on the market in August. The possibility therefore exists that the typing and editing of captions could be done on line and when complete the captions could be transmitted at high speed to a character generator for storage on an accompanying floppy disk. Subsequently the stored captions could then be read out through the character generator and mixed with the source program to produce the captioned program. We need now to configure alternative character generated captioning systems to see which system is the most cost-effective. A great many different configurations are possible. I believe we will have sufficiently good performance, data processing, and cost information to permit us to identify the configuration of personnel and equipmentwhich will give us the maximum in production at a specified quality and cost.

We have not reached the point where we are asking whether it is more effective to provide instruction by television or not. That time is probably coming. One area where television may be competitive as one of the media for instruction is vocabulary development. For example, some of us believe that the vocabulary of a large percentage of our students could be improved if we were to make use of the "native language" of these students. There is not time now to describe the "native language" fully, but let me say that most profoundly deaf individuals use

signs and some fingerspelling to communicate. The signs represent concepts or words and fingerspelling makes use of a hand alphabet to fill in words for which there is no sign. When these individuals communicate they do not necessarily use English syntax nor do they use all parts of speech. The language is American Sign Language. Some people, myself included, believe that this language can be used to assist students in English vocabulary development. Some of us believe it may have broader usefulness for English language improvement. This language cannot be written in a normal sense. It can, however, be "written" by videotaping the communicant. The language is extremely difficult for a hearing person to learn. Very few of the hearing teachers, who make up about 75 percent of the College faculty, can use the language. When the hearing teachers use signs, fingerspelling, and voice they are speaking English and the visual message is a kind of pidgin which is not English or the American Sign Language. If the recipients know English and sign they may be able to read English on the lips of the speaker.

We need to ask whether or not the use of this language improves the rate of language acquisition of some of our students. The process is being investigated now, but we are not yet collecting useable comparison data. If we should determine that it does make a difference we can consider a cost-effectiveness analysis comparing alternatives such as: hiring skilled teachers, training teachers to use the language,

or videotaping persons skilled in the language and providing video playback systems for instructional purposes to augment instruction by hearing teachers.

Turning to the computer, I again have to say that certain decisions on my part were not prompted by the results of cost-effectiveness analyses. When the Office of Educational Technology was established, the Computer Center was already in existence. It made use of a batch processing computer. The administration was concerned about the low utilization of the computer and the fact that certain computer functions were being performed off campus. I recommended, with the strong agreement of the Computer Center staff, that we switch to a time-sharing system, even though the initial annual cost would be higher. My rationale was that if access to the computer was made simple, creative students, faculty, and administrators would turn to it in ever increasing numbers. That is a common experience. It has happened at Gallaudet. We have grown from 16 lines in 1971 to 70 lines at this time with requests for many more. Our students can gain experience on very competitive equipment.

The availability of a time-sharing system has made it possible for us to provide some CAI programs at Gallaudet. These programs are in part possible because the volume of administrative work helps to justify the cost of the system. At the college level we now have two semesters of CAI material in English, four semesters in Russian, and lesser amounts in

mathematics and chemistry. We also support mathematics CAI via 15 Teletype terminals in the Model Secondary School for the Deaf and the Kendall Demonstration Elementary School, both of which are on the Gallaudet campus.

I have been skeptical of the feasibility of CAI for a long time. In the beginning when the IBM 1500 system had all the bells and whistles and PLATO had the promise of Bitzer's prototype plasma display I was as fascinated as anyone with what was possible, but doubtful that CAI would become economically feasible or that a significant volume of instructional material would become available for many years. I still lean in that direction. I am so impressed, however, with the difficulty of the English language instructional problem at Gallaudet that I believe it is worth our attempting to determine if some of the instruction can be carried out more effectively by computer. If it can, I suspect that the cost can be justified. Further, if we do find out what works I think we could identify that configuration of equipment, materials, and people which would give us the result we wish at the lowest cost. As I intimated earlier, I think the long range system will also incorporate television. I can easily imagine a terminal which could call up computer driven displays and/or videotape or video disk driven displays. The latter could carry American Sign La guage in some form with dramatization to give the student information on the meaning behind an alphanumeric display which was beyond his or her comprehension. While I can imagine this I cannot yet imagine paying for it.

We are approaching the time in our English Language Program when we must determine if the CAI instruction is making a significant contribution to the language acquisition process. Quite frankly, this is not a simple process because the teachers who make up the language program do not agree upon the best approach to use and the variety of paths followed by the different students is great. This is consistent with experience which suggests that different students require different approaches. The problem from an analysis standpoint is that it is extremely difficult to isolate the treatments so that meaningful comparisons can be made. The teachers are concerned with each student and some of them will try anything and everything to see if it will help. To date no one has said, "You will not use CAI for this group of students" nor has anyone set up a controlled basis for comparison. We are also unfortunately having to develop our own achievement tests because of the uniqueness of our problem. As you know, that is a significant task. We are at a point, however, where future growth in CAI in English is unlikely to take place unless it can be demonstrated that the additional investment is "worth it." The ten CRT terminals now in use for English Language instruction five days a week from 9:00 A.M. to 10:00 P.M. will have to suffice. I do not feel that the needed cost-effectiveness analysis will be easily made.

From my point of view a problem with cost-effectiveness analyses, where knowledge acquired is the dependent variable,

is the difficulty of formulating and carrying out a meaningful analysis. In a problem oriented and development environment with a continuing need to teach N students every semester, it is difficult, and seems impossible at times, to collect the basic empirical data with which to make the necessary comparisons. A major factor is the freedom of the teacher to teach as he or she sees fit. If that teacher is concerned about a student he or she uses what appears to be the "best" technique available. If the problem is complex, as it is in English language instruction, one probably needs a variety of approaches to satisfy the variety of needs of different students. It becomes difficult if not impossible to find a control group against which to compare an experimental group. Everything is experimental and in flux, with the objective of improving education. Having said that I hasten to add that we are seriously trying to find a means for determining which elements of the instructional process or which combination of elements contribute significantly to the language acquisition process.

ABOUT THE AUTHOR

Dr. Donald V. Torr is the Director of the Office of Educational Technology and Professor of Educational Technology at Gallaudet College. He holds a Doctor of Philosophy degree in Education from Washington University in St. Louis. He was formerly Director of the Educational Technology Center within the Sterling Institute. Prior to that he was Manager of Human Factors and Training within the Information System Operation of the General Electric Company. For a portion of this time he worked with the General Learning Corporation directing a study for the Office of Naval Research on plans for a CAI Research and Development Center. He was earlier with the National Security Agency and the Personnel Research Laboratory of the United States Air Force engaged in personnel research.